

May 7, 1951

Professor Arne Tiselius
University of Uppsala
Uppsala
Sweden

Dear Tiselius:

I am writing to tell you that I decided a month or two ago not to come to Sweden this summer. Perhaps you had heard that I had been planning to attend the meeting of the International Union of Crystallography, to be held in Stockholm about the end of June. My wife was also planning to come along. However, I decided later that the progress of my work was such as to make it wise for me to stay home this summer - I shall, however, attend the International Congress of Pure and Applied Chemistry in New York in September, and I am looking forward to seeing you at that time.

I am glad to be able to report to you that Professor Corey and I have had very good luck in our attack on the problem of the structure of proteins. You know that we decided about fourteen years ago that we would try to attack the problem of the structure of proteins by carrying out a very thorough investigation of the structure of crystals of amino acids, peptides, and related simple substances. This work has moved along steadily, and during the last three years we have been using the results obtained in the work as a basis for the formulation of acceptable configurations for polypeptide chains. We have now found a number of acceptable configurations, and have gathered evidence that makes it almost certain that they are present in proteins, and also in synthetic polypeptides. One paper, describing two of the structures, has appeared in the April issue of the Proceedings of the National Academy of Sciences, and we have seven papers that are to appear in the May issue.

Several of our polypeptide structures involve helical configurations. One of these, with approximately 3.7 amino acid residues per turn of the helix, is present in contracted muscle, ordinary hair, and other proteins with the α -keratin structure, and it seems also to be present in molecules of hemoglobin and other globular proteins. Two synthetic polypeptides have been found to have structures based upon this helix. In one of them, poly- α -methyl-L-glutamate, the helix has 18 residues in 5 turns, and in another, poly- α -benzyl-L-glutamate, it has 11 residues in 3 turns. A new arrangement of polypeptide chains in a hydrogen-bonded sheet has also been found. This structure is present in extended muscle, stretched hair, and other proteins with the β -keratin structure.

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Feather rachis keratin seems to contain both these sheets and some of the 3.7-residue helices.

A very striking structure has been found for collagen and gelatin. This structure involves three polypeptide chains, which are twisted about one another in the way that three strands of a rope are arranged. The chains are attached to one another by a lateral hydrogen bond.

One very pleasing aspect of this work is that the configurations of the polypeptide chain that satisfy our structural principles are determined quite precisely. This means that the x-ray intensities can be calculated, and compared directly with experiment. The agreement with experiment is so striking as to leave little doubt in our minds as to the correctness of the structures.

There still remains the problem of the distribution of side-chain groups. We are hoping to attack this problem by use of x-rays, in addition to chemical methods.

Is there any chance of your coming to the West Coast after the American Chemical Society meeting this September? We would be pleased if you could visit us again, and, in case that you were to come at the beginning of our school year (after October 1), we would like to have you speak to our research men.

With best regards, I am

Sincerely yours,

Linus Pauling:W